A Study of Oil Company Bonds.

by

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FOREWORD.

It would be difficult to find an industry that has expanded as rapidly as has the oil industry in the past two decades. Due to the ever increasing demands by a motorized age for gasoline, fuel oil and lubricants, the oil industry has grown to meet these demands. To make this development possible, millions of dollars have been raised and placed into the hands of the management of the industry.

Little study has been made of oil companies financial operations. Because of that fact, this study is undertaken to investigate the part of oil company finance which deals with the borrowing that companies are doing and that which they have done in the immediate past. More specifically, the purpose of this inquiry is to discover:

(1) The extent to which oil companies are financing themselves by means of bond issues;

(2) Whether or not oil company bonds conform to the generally accepted principles that govern bond issues; and

(3) Any other information which has a bearing upon the bonds of oil companies.

HISTORY AND NATURE OF THE INDUSTRY.

HISTORY:-

In order to make clearer the problem of oil company finance, a brief survey of the history and nature of the industry is given.

The process of oil refining in its simpler stages, developed abroad around 1850 and was introduced into America a few years later. The existence of petroleum at a number of places in this country had been known for a long time. The Indians since early times had obtained oil from springs and used it as a medicine. It was also encountered in considerable quantities in the brine wells dug in Pennsylvania. S. M. Kier a druggist in Pittsburg, Pennsylvania noticed the resemblance of some of the crude petroleum taken from a brine well to "American Oil" which was prescribed for his wife's illness. Soon afterward he began bottling the oil and retailing it as a medicine. The sales of the oil were small, however, and he began experimenting with the oil in a still of his own construction. This lead to the discovery that the distillate could be used as an illuminant and the residue for the cleaning of tools.[1.]

As soon as the commercial value of petroleum was demonstrated, companies began to organize for the purpose of oil

1. "American Petroleum Industry"--Harnar and Bacon.

finding. One of the more important of these was the "Seneca Oil Company" which was organized by George Bissell and some of his associates in 1858. Colonel Edwin Drake was placed in charge of drilling operations and the first well was drilled at Titusville, Pennsylvania on Oil Creek. The oil industry, by the consensus of authority, officially began in this country in August, 1859 when Colonel Drake struck oil at a depth of 69 feet.[1.]

After Colonel Drake's discovery, the industry developed rapidly. Production spread over the valley of Oil Creek and along the Allegheny River above and below Oil City. Drilling was carried on in a very unsystematic manner. Wells were located very largely by guess and about twenty times as many holes were drilled as were necessary to get the oil. By 1860 operations had extended into the valley of the Muskim River in Ohio and operations had advanced to a considerable scale. Also in 1860 wells were drilled in West Virginia and the following year a well was brought in at a depth of 100 feet that yielded 1000 barrels of oil per day for a short time. The "Oil City Register" for June 1, 1862 says, "Daily production 15,717 barrels; flowing wells, 75; wells being drilled, 358; total production to May 1862, 1,000,000 barrels; total refineries, 25". In 1865 a refinery capable of handling 2000 gallons of crude petroleum per day

1. "American Petroleum Industry"--Harnar and Bacon.

cost $11,230.[1]

After 1864 growth continued rapidly. In 1865 oil was discovered near Paola, Kansas, and at about the same time wells were opened in Texas. These discoveries marked the opening of the Mid-Continent and Gulf Fields. By 1887 operations were being carried on in the Lima-Ohio-Indiana field and the California field was opened at about the same period. By 1890 the Rocky Mountain field was discovered, which completed the opening up of the principal fields of today.[2]

The relative importance of the various fields since their discovery may be ascertained from the following table:

1. "American Petroleum Industry"--Harnar and Bacon.
2. Ibid.

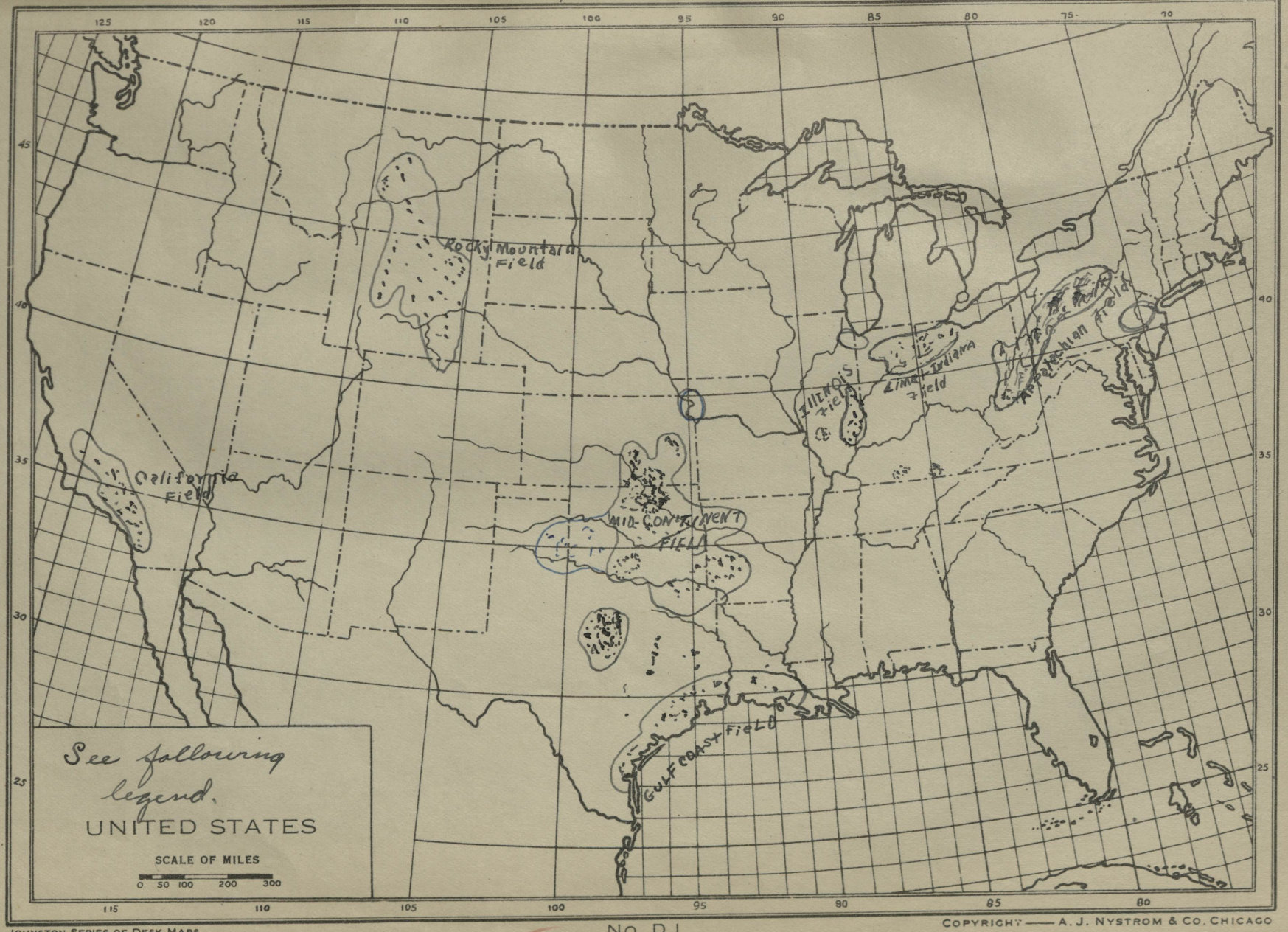
Table Showing Production of Oil by Fields in the United States for Every 5th Year Since 1859.
(In Thousands of United States Barrels).

	Appalachian		Lima-Ohio		Illinois		Mid Continent		Gulf Field		Rocky Mt		California	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%
1859	2	100												
64	2,116	100												
69	4,215	100												
74	10,927	100												
78	19,894	99.9											20	1
84	20,956	98.9											262	1
89	30,783	62.0	12,187	34							317	.9	303	1
94	22,355	63.5	17,297	35			40	1			518	1	796	1
99	33,064	57.0	20,226	35			738	1			396	.6	2,642	.9
1904	31,409	26.0	26,971	21			6,187	5	24,631	21	513	.4	29,649	.2
1909	26,536	14.0	8,211	.9	30,899	16	50,834	27	10,883	5	331	1	55,481	30
1914	48,239	9.0	51,062	1.1	21,920	8	97,995	36	13,118	5	3,783	.5	99,776	37
1919	29,232	7.0	9,000	.9	12,436	2	196,891	52	20,568	5	13,584	2	101,564	26
1924	27,056	3.0	2,287	.3	8,747	1	375,497	52	28,569	3	42,869	5	228,933	32
1926	28,617	3.0	2,041	.2	8,420	1	422,590	54	44,547	5	36,547	4	224,117	29

" A Handbook of the Petroleum Industry"—W. D. Day

From the table it may be seen that the Mid-Continent and California fields are by far the most important at present. The Appalachian field, the pioneer of the industry, had declined until its production in 1926 was only equal to 3% of the total yearly output. The phenomenal development of some of the fields is also indicated. For example: In 1884 the Lima-Ohio field was not producing enough oil to give it a rating. Five years later it was producing 12,187,000 barrels or 34% of the total United States output for that year. Up until 1904 the Mid-Continent and California fields were each producing only a little over 1% of the total production, while at the present time they are producing 54 and 30% of the yearly output respectively. In 1926 the Mid-Continent field produced more crude oil than was produced by the entire industry in 1919.

Since the beginning of production, 658,029 wells have been drilled in the United States of which there remain 296,147 producing wells. In Pennsylvania, Ohio and West Virginia, where the industry was first established, there are still 135,000 producing wells in an acreage of 1/40 the entire area of these states and the yield in this district has been 1,625,000,000 barrels. Oklahoma, Texas and California are the great producers of the present. They have only 86,500 wells but they have already produced 4,500,000,000



JOHNSTON SERIES OF DESK MAPS

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"Petroleum Industry" — Report by Federal Trade Com.

barrels.[1] The present geographical distribution of oil fields are shown in the accompanying map.

The growth of the industry may be indicated by the statistics of production.

Production of Crude Petroleum in the United States in Thousands of Barrels.[2]

1859	2	1877	13,350	1895	52,892	1913	248,446
60	500	78	15,397	96	60,960	14	265,763
61	2,114	79	19,914	97	60,476	15	281,104
62	3,057	80	26,286	98	55,364	16	300,767
63	2,611	81	27,661	99	57,071	17	335,316
64	2,166	82	30,350	1900	63,621	18	355,928
65	2,498	83	23,450	01	69,389	19	378,367
66	3,598	84	24,218	02	88,767	20	442,929
67	3,347	85	21,895	03	100,461	21	472,183
68	3,646	86	28,065	04	117,081	22	557,531
69	4,215	87	28,224	05	134,718	23	732,407
70	5,216	88	27,612	06	126,494	24	713,940
71	5,205	89	35,163	07	166,095	25	763,743
72	6,293	90	45,824	08	178,527	26	770,874
73	9,894	91	54,293	09	183,171	27	894,435
74	10,927	92	50,515	10	209,557		
75	8,788	93	48,431	11	220,449		
76	9,133	94	49,344	12	222,935		

1. "American Petroleum"--Report of American Pet. Inst.
2. "Handbook of the Petroleum Industry"--Day.

Each decade since the beginning of the industry in 1859, has seen a volume of production equal to the total production throughout the whole previous history of the industry. As the demand for more petroleum has grown, "wild-catters" through continuous prospecting, have succeeded in finding new fields, and the national supply has never failed to meet the demand.[1.]

Gasoline did not become a valuable product until the invention of the internal combustion engine in 1883 by Dainler. Up until that time, gasoline, the most volatile of crude oil derivatives, had been largely wasted. In 1886 the new power was applied to the motorcycle and in 1887 to self-propelled carriages.[2.]

A list of crude oil derivatives is given in the accompanying chart. The principal products obtained by refining are gasoline, kerosene, gas, fuel oil, and lubricants. In 1926 according to the United States Bureau of Mines these products comprized 89.7% of the total crude oil run to the stills in that year. Gasoline produced comprised 35.4% of the run to the stills, kerosene 7.3%, gas and fuel oil 43.2% and lubricants 3.8%.[3.]

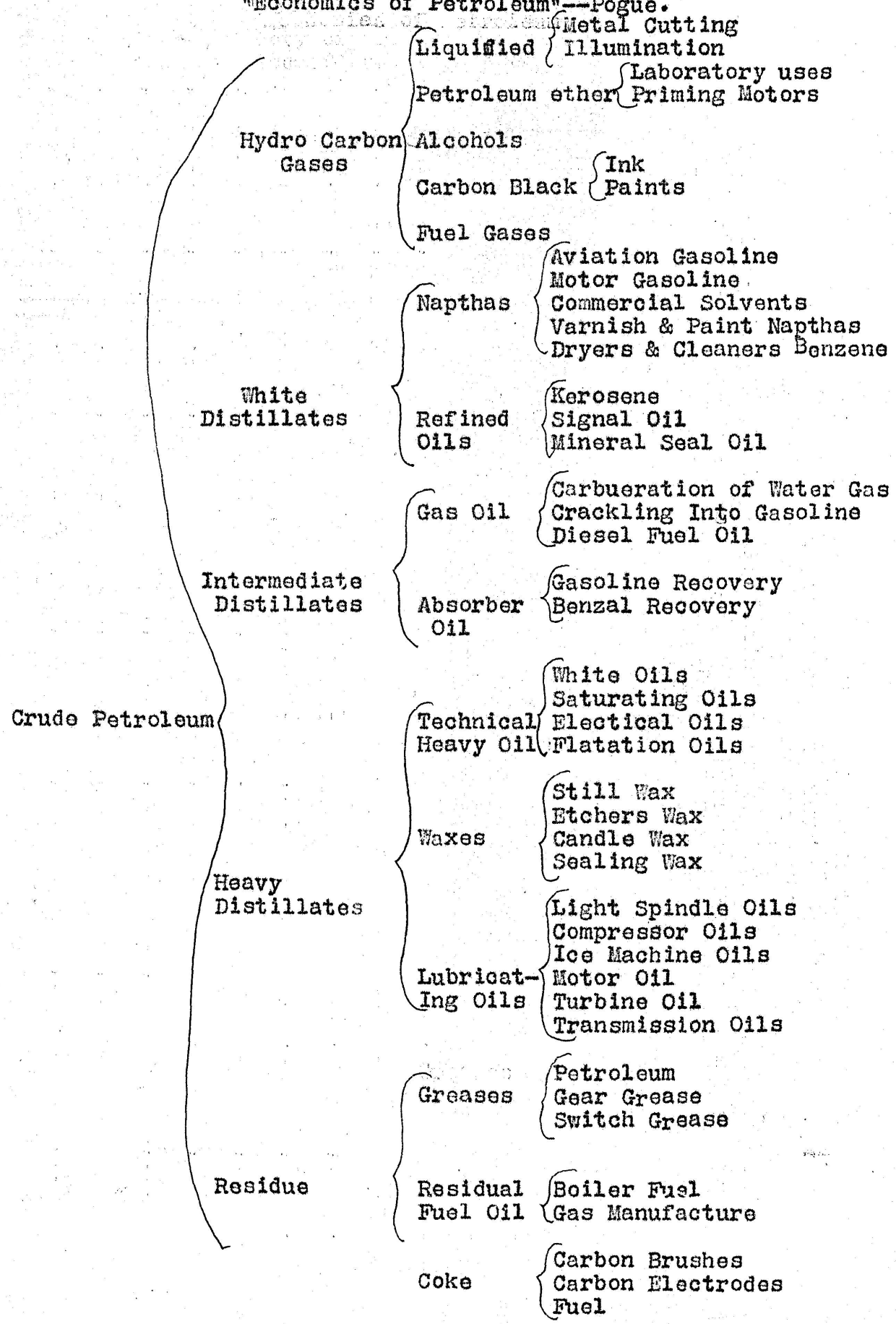
NATURE OF THE INDUSTRY:-

The petroleum industry is distinguished among our

1. "American Petroleum"--Report of Pet. Institute.
2. Ibid.
3. "Petroleum Industry"--Report of Federal Trade Commission.

Chart 1

The Principal Commercial Products of Petroleum.
"Economics of Petroleum"---Pogue.



major industries in that through its four principal functions of production, transportation, refining, and marketing, it produces its own raw materials, moves the raw materials to the place of manufacture, manufactures the raw materials and distributes the manufactured goods to the ultimate consumer. Many of our large industries exercise a high degree of control over their product, but no other industry attains the degree of control over its product from its raw state until it is turned over to the ultimate consumer as does the petroleum industry.[1.]

PRODUCTION:-

The production of petroleum deals with the finding, developing and exploiting of oil bearing territory. Of the four functions of the industry it is the most speculative in character. When a new pool is discovered the surrounding territory is subject to a rapid and sensational development if it becomes known. Cities spring into existence over night and men of modest means one day are millionaires on the next.[2.]

The locations for test wells are made by geologists from a consideration of the various ground formations. When this has been accomplished the company must obtain the right to develop the land. This may be done in one

1. "Economics of Petroleum"---Pogue.
2. Ibid.

of three ways; (1) by purchase of the land, (2) by purchase of the oil and gas rights, or (3) by leasing the oil and gas rights. In the case of outright purchase of the land or rights a settlement is immediately made with the owner of the land. When the land is leased the owner is compensating by a royalty of a certain per cent of the product obtained.[1.]

When a strike is made in one of the tests, the next step is to prove the land in the vicinity for the purpose of establishing the limits of the pool. The producer usually protects himself by having all the land around a test well leased, so he will be able to profit by his discovery regardless of the direction in which the pool may lie. This is necessary for the reason that if adjoining land was in the possession of other operators they could drill close to the test and drain the oil from the original discoverer's well.[2.]

Wells ordinarily fall between 400 and 4000 feet in depth. Costs of drilling vary from 70¢ to $2.00 per foot in the Mid-Continent field to from $10.00 to $12.00 per foot in California. Where the wells are brought in, pumps must be installed, tanks provided to store the oil, and pipe lines laid to carry the oil to and from the tanks.[3.]

1. "Oil and Gas Production"--Johnson and Huntley.
2. Ibid.
3. Ibid.

The operations of production require a large force of men and a large outlay of expensive and highly specialized equipment, which makes it imperative that the project be backed by vast financial resources. This means that where deep tests are being made the production units must be of a large size in order to be able to raise the funds necessary to carry on the process of production and to distribute the financial risks of tests by bringing into operation the law of averages.

TRANSPORTATION:-

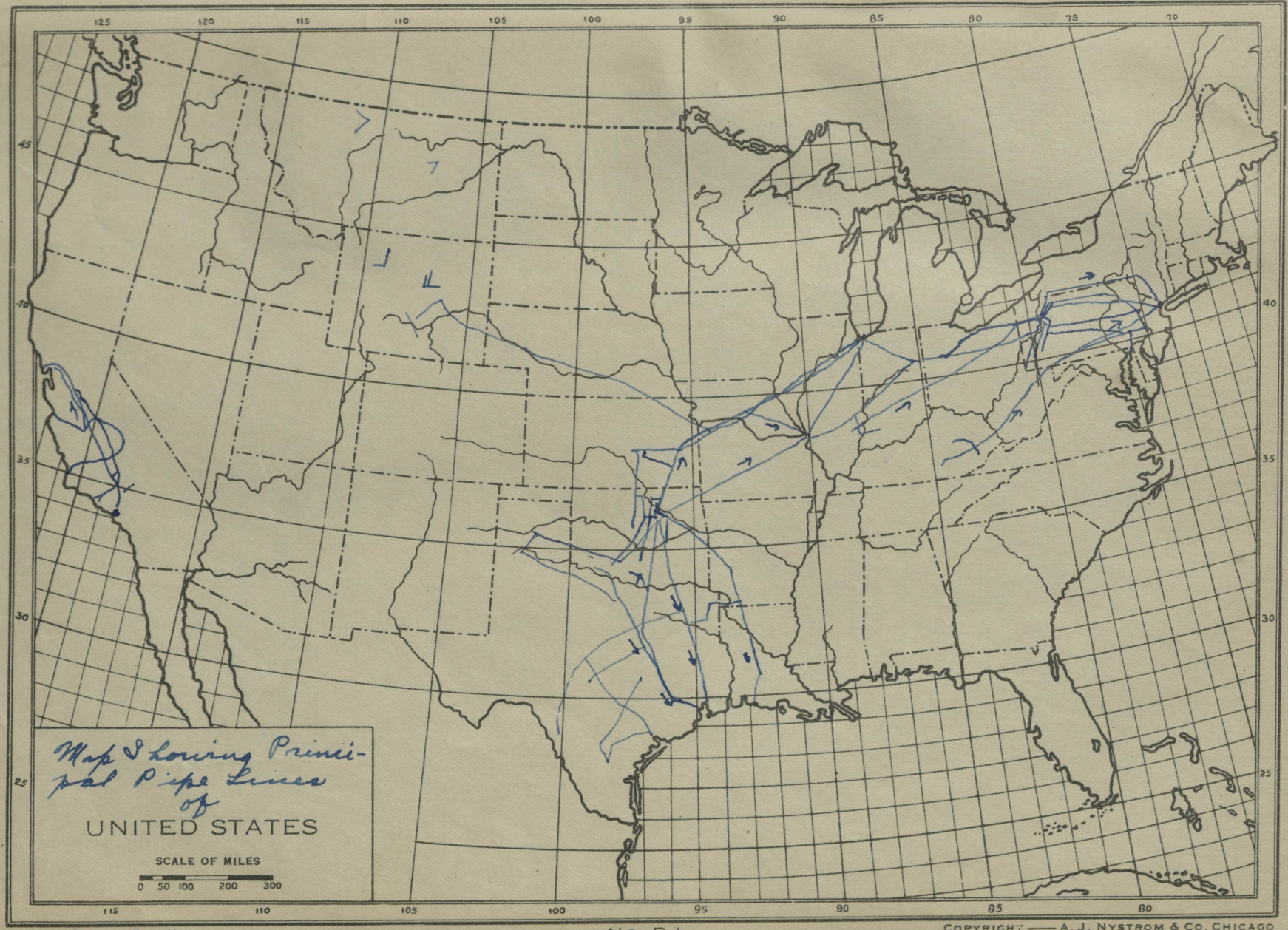
Transportation involves the moving of the oil from its source of supply to the refinery.[1] When first discovered, oil was marketed in barrels hauled on horses' backs, but by 1862 the railroads had been extended into the oil country. At first barrels were loaded upon flat cars, but leakage was so great that in 1862 the first wooden tank cars were built. By 1871 metal tank cars were built with a capacity of 2,000 gallons which has since been increased to 8,000 thousand gallons. A cheaper means of transportation, however, was desired and finally the pipe lines were introduced to supplant the other means of transportation for the most part. The first pipe line in the country was built at Titusville, Pennsylvania in 1865. It was only four miles in length, but superiority for

1. "Economics of Petroleum"--Pogue.

transportation was immediately recognized and its use developed with the industry from that time on.[1.]

At the present time there are over 50,000 miles of pipe line in this country, which is approximately 18% of the length of all our railroads. A pipe line does not mean simply a long pipe buried under the ground. It is a whole plant employed in the process of transportation and includes, besides the long line of pipe, initial, intermediate and terminal tankage stations, power plants, pumping stations, systems of communication along the line and a large force of men. Oil is produced from thousands of wells, but it is transported long distances by only a few large lines.[2.] The accompanying map shows the location of the principal pipe lines of this country.

1. "American Petroleum Industry"---Harnar and Bacon.
2. "Oil and Gas Production"--Johnson and Huntley.



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Based upon map by U. S. Geographical Survey

The cost of laying a pipe line varies with the nature of the country through which it runs and the size of the pipe. Average estimated costs are $7,497 per mile for six inch pipe and $10,066 for eight inch. The estimated costs in 1921 on Diesel engine stations with two 50,000 barrel tanks each, complete with all auxiliaries such as electric light equipment, air compressor, water well, etc. are $149,500 and $186,750 each for capacities of from 9,000 to 10,000 and 19,000 to 20,000 barrels per day respectively. Stations vary between thirty and fifty miles apart along the line. It was estimated that in 1920 there was $400,000,000 invested in pipe lines.[1.]

REFINING:-

The refining of petroleum is a manufacturing enterprise which involves the principles of chemical control and multiple production.[2.] The crude petroleum is separated into its products by a process of distillation. There are two types in general use, (1) dry distillation, which is used when a great volume of bulk products is desired such as gasoline, kerosene, and fuel oil. The heat is applied directly to the still by means of coal, gas or oil fire; (2) steam distillation, is used in the production of lubricating oils. It is the more complex and expensive

1. "American Petroleum Refining"--Bell.
2. "Economics of Petroleum"--Pogue.

of the two methods. The heat is applied indirectly in the form of steam. The oil is heated to the different boiling points of the various products and the vapors as they form are drawn off and condensed. For example, the boiling temperature of gasoline if from 70 degrees to 90 degrees centigrade. The crude is heated to this temperature and kept there until the gasoline content has vaporized. The vapor is then cooled below that temperature and it condenses into gasoline. In most of the large refineries high pressure stills are used to convert gas oil into gasoline by means of what is known as the cracking process.[1]

Refining is a large scale enterprise requiring a great amount of complicated and expensive machinery. This makes necessary large fixed investments which are subject to much depreciation through inadequacy and obsolescence. The growth in amounts of capital invested in the refining of crude petroleum is represented and an idea of the number and size of the different units may be obtained from the information which is presented in the following table:

1. "Economics of Petroleum"--Bogue.

Table Showing Number of Establishments, Capital Invested and Value of Product of the Refining Industry at Various Times Since 1890. [1.]

	1925	1923	1919	1914	1909
Number of Establishments	359	382	320	176	147
Capital	Not Avail.	Not Avail.	1,170,000,000	325,646,000	181,916,000
Average Value of Product	6,600,000	4,400,000	5,400,000	2,200,000	1,600,000
Value of Product	$2,376,000,000	$1,793,000,000	$1,727,000,000	$396,000,000	$236,000,000
Average Capital			3,600,000	1,800,000	1,200,000

1904	1900	1890
98	67	94
136,000,000	95,000,000	77,000,000
1,800,000	1,800,000	900,000
$175,000,000	$123,000,000	$85,000,000
1,300,000	1,300,000	820,000

MARKETING:-

The marketing of petroleum is carried on largely by

1. "Census of Manufacturers"--U.S. Bureau of the Census.

by the companies engaging in refining in order to keep open the outlet for the continually increasing volume of their products, and a continued tendency on the part of retailers to substitute products. The individual refiners have become more and more interested in controling their product until it passes into the hands of the consumers.

Marketing is carried on through service stations, tank stations, tank wagons, refinery sales and exports.

The extensions of pipe lines has made it possible for the refineries to be located near the centers of consumption. This has made possible a very efficient marketing system. The crude oil goes by pipe line to the refinery and the finished product is distributed directly to consumers by tanks and tank wagons.

Accompanying the growth of the industry has been the growth and integration of the individual company. Each of the individual companies has tended to take over all of the functions of the industry in order to obtain the advantage of large scale production and consumer demand for its product.

From a group of 42 companies included in Moody's Manual of Industrials fro 1925, we find that six companies perform one of the four principal functions of the industry; six pefform two functions; five perform three functions;

and twenty-five perform all of the functions.

Out of the 42 companies chosen at random it is to be remarked that 25 or over 50% carry on the four principal functions of production, transportation and marketing. The growth in size of individual companies may be traced in Table I included later.

UNDERLYING PRINCIPLES GOVERNING BOND ISSUES:-

There are certain generally accepted principles of finance which apply to any type of business enterprise that should be considered when capital is to be raised by the issue of bonds. These principles may be stated as follows: (1) a business which issues bonds must be able to insure the safety of the principal; (2) a business which issues bonds must have a stable income and (3) a business which issues bonds must offer an investment which has an acceptable duration.

To secure the safety of his principal is the first consideration of an investor in bonds. A person who buys a bond does not place his money with the issuing company for the purpose of becoming a part owner in the enterprise. He does so that he may earn what he considers a fair return on his money during the term of his investment and then have his original sum returned to him. An investment is made on the basis of a judgement relative to the solvency, soundness and progress of the company which issues the securities. Since this emphasis on the security of principal exists, its customary (1) to lay down the conditions under which the earnings of the company shall be administered during the tenure of the loan; (2) to pledge specific assets of the company for the satisfaction of the bondholders' claims; (3) to limit further bonded indebtedness; and (4) to extend the claims of the bondholders

to assets coming into possession of the company in the future. These agreements take the form of mortgages on assets, pledges of various kinds of collateral, after acquired clauses, and sinking fund maintenance.

While fundamentally interested in the soundness or long time position of the business, the investor is almost equally interested in the solvency or immediate debt paying ability of his debtor. His periodic interest payments must be met. If income is fluctuating, it may result in the inability to meet current interest payments with the resulting steps of foreclosure, receivership and reorganization or liquidation. This proceeding often results in losses to the bondholder through the dissipation of values due to the shrinkage of the assets which attends a forced sale. Such an emergency would not arise in a business where earnings were always sufficient to amply cover the fixed charges. So we see that stability of income is a most important factor governing the issuing of bonds.

In making a bond investment an investor must exercise no small amount of care and discretion. One of the leading motives in making such a disposal of his funds is to so place them that he will be free from the bother of constantly looking after them. This necessitates a suitable duration of investment which requires only occasional supervision.

THE EXTENT TO WHICH BONDS ARE BEING USED BY THE OIL INDUSTRY:-

To find the extent to which the oil industry is financing itself by means of bond issues, we have referred to Moody's Manual of Industrials. The companies used in the study are all of those presented in the manual. A period of fifteen years was chosen because it was considered to be long enough to indicate the trend of bond financing and also because the information was the most complete covering this period. In Table I there is shown the assets and bond issues by companies for the period 1912 to 1926. The data for certain companies does not extend over the full period due to the fact that some of the companies included have been organized at different dates during the period; that a number of the companies have been consolidated or have passed out of existence; and that no data for some years was given.

For the year 1926 the assets and bonds outstanding for the companies listed are shown in the first column, In the group of fifty-three companies there were forty-one companies or seventy-three percent which issued bonds; and fifteen or twenty-seven percent which did not. Taking the totals of all companies listed it is found that the ratio of bonds outstanding to the assets is nine and seven-tenths percent, or stated in other words; nine and seven-tenths of the assets were obtained by borrowing through the medium of bond issues.

Table I Showing a list of companies with their total assets and bonds outstanding for the period 1912–1926.

Company	1926 assets	1926 Bonds	1925 A.	1925 B.	1924 A.	1924 B.	1923 A.	1923 B.	1922 A.	1922 B.	1921 A	1921 B	1920 A.	1920 B	1919 A	1919 B	1918 A	1918 B	1917 A	1917 B	1916 A	1916 B	1915 A	1915 B	1914 A	1914 B	1913 A	1913 B	1912 A	1912 B.
Allen Oil Co			2,300	60	2,249	30	2,210		2,197		3,008																			
American Ref. Co	8,486	72	7,108	143			4,614	291	3,546	302																				
Associated Oil Co	128,114	21,525	124,857	23,746	166,274	24,000	147,441	24,000	106,889	5,977	100,133	8,310	96,590	9,278	88,112	11,209	83,580	10,445	80,688	12,599	74,502	12,862	71,24	13,382	71,507	15,212	71,570	15,685	68,595	15,599
Atlantic & Gulf Pet.	2,447	720					2,436	770	2,456	770	2,455	872																		
Arena Oil													7,971						7,531	240										
Atlantic Ref Co	149,213	17,533	134,286	23,533	130,986	27,135			119,668	15,028	111,077	15,028							60,771		41,982		32,327		27,258		30,760		28,556	
Atlantic Lobos	25,898																													
Beacon Oil	25,553	5,088	19,876	1,143																										
Barnsdall							37,546	7,854					31,705	9,500																
Brookshire							454																							
Barnett																			2,775											
Caddo Central							19,396	6,238					23,227	6,195																
Caribou							1,487																							
Consolidated Royalty	6,418		6,071		5,349		5,754		5,889		6,036																			
Continental	83,332	1,436	70,873	1,205	71,103	502			19,164	168	15,818	170			13,867															
Crystal Oil Ref.	4,405	457																												
California Pet Corp	98,897	18,452	75,835	7,151	57,563	7,892	58,161	8,766	46,145	791	37,067	852	35,172	867	36,565	1,495	26,839	1,539	36,079	1,638	34,769	1,818	34,227	1,902	34,426	1,954	34,212	2,212		
Eastern Oil Co							7,548	3,089											4,506						4,731					
Foster Pet. Corp.	19,406	1,556	5,147	600	2,031	600																								
Federal Pet Corp																														
Galena Signal	31,793	4,203	42,951	7,319	41,170	7,619	41,834	7,804	41,246	8,192	39,514	8,800	35,126	6,060	30,723		31,801		19,074											
General Pet.			127,543	27,287			106,563	21,120	76,718	9,053	64,411	10,267	47,385	2,920	42,229	4,705	37,346	5,205	32,239	5,782	16,937		16,351				17,111			
Gulf Oil Corp.	499,337	38,904	427,610	42,904	379,533	48,954	335,498	35,000	348,378	76,000	272,774	44,888	269,729	18,800	218,476	150	173,175	200	142,962	250	106,371	300	57,822		48,796		42,551	247		
Houston	48,647	7,354	46,577	2,000	37,267		38,238		37,415		38,210		36,641		28,423		33,607	4,283	36,489	4,768	34,861	5,473	35,922	6,621	33,164	5,947				
Honolulu	188,011	25,000	168,177	25,000	146,257	25,000	139,880	25,000	123,042	25,000	124,258	25,000	111,485	25,000																
Indian Ref Co	19,406	1,556	22,609	2,012	20,869	1,275	25,071	500			24,091		26,669		14,334		13,366	463	11,310	1,665		2,487	11,498	2,790	11,271	3,868	12,340	4,979	13,731	4,194
Louisiana Oil Ref	25,173	399	21,114	3,259	21,291	4,128																								
Mexican Pet Corp	122,008	979	112,631	985	116,962	8,515	123,232	8,607	118,819	8,372	102,261	10,505	87,145	1,009	77,460	1,026	78,546	1,279	83,034	2,289	79,384	3,867	70,668	4,804	61,282	4,687	63,084	5,674	83,617	8,294
Mid Continent Pet	84,065	10,969	77,767	11,762	79,687	12,500	73,829																							
Magna							10,118												122,822	9,603					21,821	9,895				
Marland	74,763	89	92,802		93,869		88,793	9,678	66,036	10,710	64,317	7,442	65,752																	
Magnolia													193,620	8,762					122,822	9,603	50,244	9,796	24,363	9,890			19,763	10,000		
Midwest																			7,291						6,771					
New England	34,694	15,919	33,830	16,286			22,499	9,835																						
New York Oil	14,834	1,800	14,834	2,000	8,625		11,925		11,588																					
National																	27,560	5,000												
Ohio Oil			99,878	267	97,697	267			81,862		90,515				81,710		85,309		85,484		82,723		81,721		82,294		78,427		78,429	
Pan American Western	63,316	26,250	57,228	11,250																										
Producers & Refiners	59,249	3,362	59,717	2,871	73,453	3,645	70,061	3,916	47,987	5,421	32,790	3,123	35,663		24,095															
Pure Oil	218,920	10,430	217,809	20,813	211,490	28,055	179,061	4,026	169,239	11,059	135,830	13,069	131,670	15,460	120,850	5,673														
Pacific			95,385		89,125		89,123				84,157																			
Pierce Oil			7,172		7,407				10,961		12,344				11,019		2,660		46,711	11,523					23,891	10,000			26,663	
Panhandle Pro & Ref							10,435						12,779																	
Phillips	166,274		129,832	322	103,407	9,070			63,812	5,746	44,915	3,500			26,031															
Prairie	167,971		154,424		142,806				128,729		180,905				180,203		117,955				84,459		72,691				84,569		65,421	9,000
Sun Board	2,774	153					4,053		1,472																					
Skaggs	49,642	15,274	43,011	12,642			34,028	10,191	30,193	12,737	29,506	12,603	28,963	11,478																
Shell Union	373,890	50,000	332,427								29,526		9,309		7,550		7,249													
Shelley	72,864	1,874	63,438	6,470	62,105	8,380	56,915	2,846	45,646	3,182	35,729	3,500	25,876																	
Sinclair	364,817	81,256	351,912	85,704	346,198	87,307	341,674	73,973	318,650	50,000	342,423	45,444	354,506	47,504	266,886		94,569	18,900	93,803		55,280	16,000	54,789	16,000						
Standard - New York	69,211	114,172	582,960	35,000	406,211	20,000	418,004	50,000	418,746	50,000	333,242	50,000	341,949		299,592		234,095		204,307		168,662		117,284		102,024		94,779		82,210	
- New Jersey	1,541,945	120,000	1,369,170				1,148,004		1,123,760	446,788	1,115,939	102,312	1,102,312		835,360		671,316													
- Kansas	11,540		11,456		10,534				11,920		10,753				9,640		8,770				5,101		8,845				3,871		2,312	
- Kentucky	50,707		44,518		36,851		30,956		24,908		22,803		23,282		16,960		15,287		12,192		9,480		7,232		6,315		5,246		5,105	
- California	573,813		373,722	20,000	352,804	22,500	341,945	25,000	305,957	25,000	276,933	25,000	245,755		174,817		145,231		126,723		109,460		98,943		97,298		87,970		67,315	
- Indiana	446,496		466,059		361,481	46	338,934	78	318,789	93	305,675	110	237,634	184	154,672	250	145,428	316	126,934	438	86,444		60,604		46,986		49,190			
Superior	9,809	462	9,194	690	9,151	714	8,420		8,795		8,791		10,729																	
Southern							13,893								10															
Sun	58,652	9,466	55,145	9,373	51,461	10,000	47,102	13,278	44,744	9,617	45,131	10,283	47,452	5,707																
South Penn	49,605		48,136		28,848		40,019				39,851				36,283						25,219		24,717				24,238		24,717	
Tidal Osage	14,266	1,400	12,666	2,722	16,803	2,987	16,188	3,500	18,966	3,500	16,318	3,500																		
Trona Refining	2,039	542	1,878	532	1,918	527	2,087	600	1,991	717																				
Transcontinental	52,830	5,821	52,098	5,909			229,215	8,675	217,692	7,000	209,347	7,900	204,830																	
Tide Water	114,618																		42,711		43,044		28,870		25,991		26,472		26,663	
Union Oil	326,126	22,440	243,816	24,100	231,724	20,110	220,004	24,253	172,111	18,468	104,615	8,670	101,905	9,245	89,679	10,143	80,221	11,331	72,566	12,078	63,821	9,930	58,858	10,002	60,879	11,239			65,017	10,796
Vacuum			144,492	14,900	133,970	16,100			122,771	17,000	109,663	19,243			79,619		75,387				57,540		44,924				34,454		31,998	
Valvoline	19,897	1,714	10,903	1,785	9,974	1,857	9,479	1,929	8,775	2,000	7,895		6,727		5,924	520	4,582	520			~~57,540~~		~~44,924~~						3,281	520
White Eagle	29,865	2,000	26,766	2,400	24,739	2,800	22,141	300	18,617	400	12,301	500	10,219	168																
Richfield	55,930	14,136					12,880	1,500					2,202		2,291															
Independent	30,506	2,700	16,718		10,096		7,884		8,746																					

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To make clear the extent to which bonds have been used by the industry over the fifteen year period, two ratios have been chosen. Total percent and median percent have been calculated for each year. Total percent was obtained by dividing the total of bonds outstanding of all the companies regardless of whether or not they had bonds outstanding. The median percent was obtained by using only those companies that had bonds outstanding in 1927, the ratio of bonds to assets was taken for each individual company and the median percent for each year was then determined. The total percent is more representative of the industry as a whole as it contains all companies. The following table shows the two percentages as calculated for each year of the period under observation:

*	1912	13	14	15	16	17	18	19
Total %	7.2	6.4	8.5	7.9	5.8	2.4	2.6	1.5
Median	15.2	6.4	7.0	12.1	10.3	4.4	3.8	0.0

	1920	21	22	23	24	25	26
Total %	3.5	7.5	7.8	6.4	9.3	6.9	9.8
Median	0.0	8.1	6.5	4.3	8.6	10.0	12.0

In Chart II, this information is presented graphically to indicate the trend over the period under observation. From chart and table we can see that the percent of bonds to assets over the period has been a fluctuating one. While subject to more violent fluctuations the curve of

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Chart 2
Chart showing the percent and median percent of bonds outstanding over the period 1912-1926.

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median percent has followed the same general trend as the curve for total percent. From a fluctuating tendency prior to 1914 the percent of bonds to assets shows a steady decline to 1919. Then a rapid rise during 1920 and 1921 and then fluctuating with a gradual upward trend to 1927. For the industry as a whole the bond issue as a means of finance is no more popular than it was in the pre-war period.

Since the percent of bonds to assets never rises very high and the fluctuations are rather violent, the question arises whether or not bond financing is resorted to by the industry for temporary rather than permanent needs. If this were true, it would be logical to believe that in times of prosperity the bonds outstanding would be low and in times of depression the bonds outstanding would tend to increase. To test this idea and see if there is a relation existing between prosperity and amount of bond issue we have endeavored to secure a figure to represent the prosperity of the industry for each year. When an industry is prosperous, its net income is high, so the figure chosen to represent the prosperity of the industry each year was the ratio of net income to assets for each year. Fifteen companies were chosen at random. They were companies that extended over the fifteen year period under observation and the total of their assets and net income were listed. This is shown in detail in Table 2. Total assets for each year were divided by total net income for each year with

Table2. Showing Yearly Net Income before Interest and Dividends for oil Companies over period of Years. (1000 figure omitted).

* Deficit

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926
Associated Oil	4,395	5,040	6,625	7,721	11,076	10,800	13,794	12,718	8,457	13,293	14,369	18,509	17,216
Calif. Pet. Corp	2,241	1,354	1,511	2,462	3,056	3,128	4,071	3,230	4,529	7,676	4,415	7,496	7,906
Houston Oil Co	1,253	1,283	1,372	1,419	1,568	1,695	1,811	766	1,223		1,518	1,595	1,957
Indian Ref. Co		709	3,590	3,608	4,474	3,353	2,309			* 1,061	597	597	1,320
Prairie Oil & gas	1,448	1,161	1,655	9,996	7,739				10,142	8,831	10,330	14,181	15,962
Mexican Pet. Co	2,763	2,888	7,153	4,986	6,924	4,427	9,773	12,540	25,276	11,088	2,817	19,820	14,020
South Penn.	2,215		4,745	6,107		2,268	5,489	404	* 1,265	* 938	1,527	2,375	3,152
Standard Oil,Cal.	10,058	0,525	17,605	10,649				48,072	36,963	31,319	35,606	43,629	55,122
Standard Oil,Kan	704	1,124	2,068	1,967	2,713	3,726	6,080	3,377	5,086	6,286	6,151	8,272	8,306
Standard Oil,Ind.	6,590	15,998	30,043	42,908	43,263	34,604	61,376	23,288	55,881	446,938	46,088	60,532	62,598
Standard Oil,Kan.	33	563	1,270	1,422	1,413	1,661	2,043	207	1,232	* 280	* 480	494	163
Standard Oil, O	1,208	2,147	3,848	4,567	5,474	2,981		3,673	7,652	3,587	4,245		
Standard Oil,N.Y.	7,735	15,761	36,638	30,000	28,642	43,165	39,405	12,665	22,834	18,363	38,671	72,175	71,646
Tide Water	694	916	3,320	4,930	7,890	7,032	4,896	960	6,673	6,362	9,049	11,896	11,120
Union Oil	3,491	2,524	7,850	2,276	6,600	11,179	12,510	12,181	11,715	8,809	11,608	11,249	12,951
Total	44,828	62,074	129,293	141,108	130,833	130,419	163,498	134,080	196,388	160,173	186,511	272,820	283,079

Table Showing Yearly Assets for 15 Oil Companies Over Period of Years.

Associated Oil	71,570	71,241	74,502	80,688	83,580	88,112							
Calif. Pet. Corp	34,426	34,227	34,769	36,079	36,339	36,565	96,590	100,133	106,899	147,441	156,244	156,244	128,114
Houston Oil Co	35,104	35,922	34,861	34,148	33,607	38,423	35,172	37,067	46,145	58,161	57,563	57,563	98,897
Indian Ref. Co	11,271	11,498	10,386	11,310	13,366	14,334	36,644	38,210	37,415	38,238	39,267	39,267	48,647
Prairie Oil & Gas	92,716	92,591	84,495	102,605	117,955	130,203	26,699	24,091	23,410	25,081	20,869	20,869	19,406
Mexican Pet. Co	64,962	70,662	77,191	83,045	78,546	77,460	153,476	130,005	128,729	131,890	142,806	142,806	
South Penn.	25,991	24,719	25,219	42,711		35,283	87,145	102,261	119,819	122,332	116,962	116,962	122,008
Standard Oil,Cal.	97,298	98,543	109,400	126,923	145,231	174,317	39,898	39,851	40,019	40,119	38,848	38,848	49,663
Standard Oil,Ken	6,315	7,232	9,480	12,192	15,287	16,950	245,755	276,733	305,957	341,984	352,804	352,804	
Standard Oil,Ind	46,986	60,606	86,414	126,934	145,428	154,672	23,382	22,503	24,908	30,956	44,518	44,518	50,707
Standard Oil,O	11,900	12,951	15,936	20,752	24,461	28,203	273,634	305,675	318,789	338,934	361,481	361,481	446,496
Standard Oil,N.Y.	102,024	117,284	168,662	204,337	234,085	299,153	38,159	38,711	45,308	47,351	49,946	49,946	54,883
Tide Water	25,991	28,870	42,004	50,517	53,188	59,995	347,949	333,248	418,746	418,604	406,211	406,211	691,211
Union Oil	60,879	58,879	63,821	77,566	80,221	89,679	80,293	90,194	90,255	91,335	94,432	94,432	114,618
Standard Oil,Kan	3,183	3,845	5,001	7,310	8,770	9,640	101,905	104,615	172,111	220,004	231,724	231,724	326,126
Total	670,611	715,065	842,241	1070,082	1017,106	1,314,428	12,357	10,753	11,920	11,062	10,534	10,534	11,540
							1598628	1654944	1889320	2063009	2113675	2363482	2162296

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CHART 3

Chart showing relation between Percentage of Bonds Out-
And ratio of Net Income To Total Assets over the Per-
iod 1914-1926.

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the following resulting percentages:

1914	15	16	17	18	19	20	21	22
6.8	8.7	15.3	13.8	14.2	12.8	14.2	8.9	10.4

23	24	25	26 *
7.8	8.9	11.8	10.2

When these percentages were plotted with the percentages of bonds to assets the results shown in Chart 3 were obtained. It can be seen that a negative correlation exists between the two curves. In general when the prosperity of the industry increases the bonds decrease and when the prosperity of the industry decreases the bonds outstanding increase.

TYPES OF BONDS ISSUED:-

In studying the types of bonds issued, it was decided to classify the bonds as to the nature of their security. Under this classification we find three types: mortgage bonds, debenture bonds, and collateral trust bonds. Mortgage bonds are those that are secured by a first lien on specific assets. Debenture bonds are those which are secured only by the general credit of the issuing company and rank, in their claim on the assets of the company, equally with other general creditors. Collateral trust bonds are those secured by a first lien on stocks or bonds which have been pledged by the issuing company.

*"Manual of Industrials"—John Moody.

The study includes those issues which are described in Moody's Manual of Industrials for the years 1914, 1920 and 1926. Tables 3,4, and 5 show the detailed information which was collected. These years were chosen because they were distributed evenly over the period to be observed and it was considered that these years would reflect any changes or trends which were occurring. Summarizing the information we find:

Mortgage Bonds.

	1st		2nd		Debenture Bonds		Collateral Trust	
	No.	%*	No.	%	No.	%	No.	%
1914	9	50	1	5	5	26	4	20
1920	12	38			17	54	2	6
1926	19	33	3	5	26	45	8	14

The provisions of the agreement concerning the issue were also examined to determine how many were sinking fund bonds, how many were convertible, how many were serial and how many were callable. A sinking fund bond is one which provides that the management will set aside a certain sum out of earnings each year for the purpose of buying back a certain number of bonds each year or if accumulating a fund to be used to redeem the bonds at maturity. A convertible bond issue is one which may be exchanged for some other security at the option of the holder, usually capital stock. A serial bond issue is one which provides that a certain number of the bonds mature and are paid

* Percent of Total for each year (same on page 27 and 31).

off each year, throughout the life of the entire issue; thus retiring the issue gradually. A callable bond issue is one which may be called in and paid off by the issuing company prior to maturity. They usually require notice and are redeemable at par or above par.

Classified upon the basis just discussed we find:

	Sinking Fund		Convertible		Serial		Callable	
	No.	%	No.	%	No.	%	No.	%
1914	9	50	5	28	5	28	14	77
1920	21	68	7	22	2	6	22	71
1926	45	77	3	5	3	5	54	93

Probably the most noteworthy fact to be gleaned from these figures is the remarkable increase in popularity of the debenture bonds and the decline in popularity of mortgage bonds. The mortgage bonds decline from 55% of the number of issues in 1914 to 38% in 1920 and 1926. While the debenture bonds increase from 26% in 1914 to 54% and 45% in 1920 and 1926 respectively. Coincident with the growth of the number of sinking fund bonds, from 50% in 1914, they have increased to 68% in 1920 and 77% in 1926. This may be interpreted as an index of the increasing strength of the oil industry. As the industry has become more powerful it has more and more obtained the confidence of the public and the investment banker. The result has been that the oil companies are able to issue bonds without the pledging of specific assets for security and are

substituting in its stead a sinking fund agreement which seems to give all the security desired.

The steady decline of convertible bonds from 28% to 5% may be explained by the fact that the common stock of oil companies is becoming relatively stable in value. The convertible privilege is usually included in the bonds of companies whose common stock is more or less questionable in value and such as are forced to resort to the issue of bonds which carry with them the speculative privilege of conversion into common stock to furnish an added inducement to investors and reduce interest rates. A decline in the proportion of convertible securities is an indication of increasing stability in borrowing operations in that the bonds are placed purely upon a borrowing, rather than a speculative basis.

The decline in serial issues is largely explained by the increase in sinking fund agreements providing for the investment of the sinking fund in the bonds of the company covered by the fund. In this way the function of the serial bond is largely taken over by the sinking fund.

The high percentage of callable bonds may be explained by the fact that in the mind of the issuing company the bonds are regarded as short, rather than long time borrowing which have been resorted to for reasons of business expediency with the idea that when business conditions

become favorable, they will be redeemed and retired. This theory has some support in the bond issuing records of the various companies, for example, we are choosing two companies from Table I at random to illustrate the fluctuations in amounts of outstanding bonds over a period of years. Other cases may be seen by referring to Table I.

Total Bonds Outstanding for Two Oil Companies.
(1917---1926)

	1926	1925	1924	1923	1922
Mexican Petroleum	979	985	8,515	8,607	8,327
Indian Refinery	1,556	1,275	500	---	---

	1921	1920	1919	1918	1917
Mexican Petroleum	10,505	1,009	1,026	1,279	2,289
Indian Refinery	---	---	---	463	1,665

In the Mexican Petroleum Company's record we see a remarkable advance in the bonds outstanding from 1921 to 1924. In 1921 an issue of 10,000,000 gold 8s 10 year bonds were floated. During 1922 the earnings advanced 100% to $25,000,000 and in 1923 the net earnings were $10,000,000 in spite of the fact that there was a depression in the industry. In 1924 the $6,000,000 still outstanding was retired.

For the Indian Oil Company the record of earnings is high prior to 1918 and when the last bonds outstanding

matured they were retired. In 1923 a deficit was followed by another issue of bonds to make the bonds outstanding aggregate $2,102,000 in 1925.

In both companies the bonds outstanding show a steady decrease even when earnings are only moderately good which indicates the desire of the companies to remove the burden of fixed shares as rapidly as possible. While these were only two companies, they were chosen at random and serve to indicate that borrowing by oil companies is of temporary rather than long time in nature and that the callable privilege is actually exercised when earnings make it possible.

In endeavoring to increase the feeling of security among their bondholders, practically all of the companies include in their trust indentures some such paragraph as the following: "The company agrees not to issue any obligations having priority over this issue nor to mortgage or pledge any assets or property, but this shall not prevent the making of purchase money mortgages or pledges on real estate, stocks, bonds or other securities acquired subsequent to the date of issue". This paragraph protects the bondholders by preventing the future dilution of the security behind their bonds which would occur in the case of subsequent prior leins on the companies existing assets, but by it the issuing companies avoid the "bugaboo" of the

'after acquired' clause.

DURATION:-

When the bonds are classified on the basis of the number of years for which they are issued we obtain the following results:

Years to Maturity	1		2		3		4		5		6	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1914			1	5					3	16		
1920	1	3	1	3	2	6	1	3	4	12		
1926	1	1.5	1	1.5	2	3	2	3	11	19	1.	1.5

Years to Maturity	7		10		12		15		20		30	
1914			6	33	1	5	1	5	5	26		
1920			11	35	2	6	2	6	4	12	1	3
1926	2	3	17	29	6	10	9	18	4	9	2	3

While no very significant conclusions may be drawn from these data, they do indicate the usual periods for which oil bonds are issued. It can plainly be seen that the most popular lengths of issue in 1926 were five, ten and fifteen years. The five year bonds being 19,29 and 18% respectively of the total bonds outstanding and making in total 66% of the bonds outstanding.

Since loans from 1 to 5 years are usually considered short term notes, loans from 6 to 10 years short term bonds, loans from 10 to 15 years medium length bonds, and loans over 20 years long term bonds, we have divided the out-

standing bonds into groups on this time basis. The following table shows the result:

	1 to 5 yrs		6 to 10 yrs		11 to 15 yrs		Over 20 yrs	
	No.	%	No.	%	No.	%	No.	%
1914	4	20	6	33	2	10	5	26
1920	9	30	11	35	4	12	5	16
1926	17	29	20	34	15	26	6	12

A steady increase over the period studied in the medium length bonds may be noted, which is accompanied by a steady decrease in the long time bonds. It may also be noted that a majority of the issues are ten years or less, including 53, 65, and 63% of the outstanding bonds for the years 1914, 1920, and 1926 respectively. We can see that the industry as a whole furnishes enough variation in length of investment to administer to the needs of almost any investor in so far as a favorable investment period is desired. The bonds have lengths to maturity from one to thirty years. Since they are relatively speculative in character due to the nature of the industry, this emphasis may have arisen because the public has felt that its funds were safer if loaned to the industry for a shorter period and oil companies have catered to this idea. On the other hand it may have arisen within certain companies themselves as a result of finding the shorter term bonds were more satisfactory to their needs since their income was more fluctuating and the future of the industry always held a high degree of uncertainty.

Table 3 Showing the Outstanding issues of Oil Company Bonds in 1926.

Issues	Yrs to Maturity	Callable	Sinking Fund	Type
Associated Oil 6s	12	No	Yes	Debenture
Atlantic Gulf 6s	10	Yes	No	1st Mortgage
Calif. Pet Corp 5½s	12	Yes	Yes	Debenture
Calif. Pet Corp 5s	12	Yes	Yes	Debenture
Crystal Oil Ref 6s	6	Yes	No	1st Mortgage
Allen Oil Co 7s	5	Yes	No	1st Mortgage
Foster Pet.Corp 5s	5	Yes	No	Collateral T.
American Ref. Co 7s	5	Yes	No	1st Mortgage
American Ref. Co 6s	5	Yes	No	1st Mortgage
Beacon Oil Co 6½s	10	Yes	Yes	1st Mortgage
Beacon Oil Co 6s	10	Yes	Yes	Debenture
Beacon Oil Co 6s	10	Yes	No	Debenture
Gulf Oil Ref 5s	15	Yes	Yes	Debenture
Gulf Oil Ref 5½s	4	Yes	No	Debenture
Gulf Oil Ref 5s	20	Yes	Yes	Debenture
Manhattan Oil Co 6s	5	Yes	Yes	Collateral T
Mid Continent 6½s	15	Yes	Yes	1st Mortgage
New England 8s	10	Yes	Yes	1st Mortgage
New England 8s	20	Yes	Yes	1st Mortgage
Middle States C. 7s	20	Yes	No	Collateral T
New York Oil 7s	5	Yes	No	1st Mortgage
Pure Oil 6½s	10	Yes	Yes	Debenture
Producers & Ref. 8s	10	Yes	Yes	1st Mortgage
Seaboard Oil 8s	5	Yes	Yes	Debenture

Shaffer Oil 6s	10	Yes	Yes	1st Mortgage
Shaffer Oil 6s	2	Yes	Yes	Debenture
Shaffer Oil 6s	5	Yes	Yes	Debenture
Shell Union 5s	20	Yes	Yes	Debenture
Sinclair 7s	15	Yes	Yes	Collateral T
Sinclair 6½s	15	Yes	Yes	Collateral T
Sinclair 6s	3	Yes	Yes	Collateral T
Shelly 5½s	12	Yes	Yes	Debenture
Teonia 8s	15	Yes	Yes	1st Mortgage
Teonia 8s	30	Yes	Yes	1st Mortgage
White Eagle 5½s	10	Yes	Yes	Debenture
Independent 6s	12	Yes	Yes	1st Mortgage
Superior 7s	5	Yes	Yes	1st Mortgage
TransContinental 8s	10	Yes	Yes	1st Mortgage
TransContinental 7s	5	Yes	Yes	1st Mortgage
Union Oil 5s	20	Yes	Yes	1st Mortgage
Union Oil 6s	20	No	Yes	1st Mortgage
Union Oil 5s	10	Yes	Yes	Debenture
Standard N.Y. 6s	5	Yes	Yes	Debenture
Standard N.Y. 5s	15	Yes	Yes	Collateral T
Standard N.Y. 4½s	10	Yes	Yes	Debenture
Standard N.Y. 6½s	14	Yes	Yes	Debenture
Standard N.J. 5s	20	Yes	Yes	Debenture
Pan American 6s	15	Yes	Yes	1st Mortgage
Pan American 6s	15	No	Yes	Debenture
Richfield 6s	15	Yes	Yes	1st Mortgage

Richfield 6s	3	Yes	No	Debenture
Valvoline 7s	15	Yes	Yes	Debenture
Indian Ref. 6s	7	Yes	Yes	1st Mortgage
Indian Ref. 5½s	7	Yes	No	1st Mortgage
Houston Oil 6½s	10	Yes	Yes	Debenture
Humble 5½s	10	Yes	No	Debenture
Humble 5s	10	Yes	Yes	Debenture

Table 4 Showing the Outstanding Issues of Oil Company Bond in 1920.

Issues	Yrs of Maturity	Callable	Sinking Fund	Type
Associated Oil 5s	2	Yes	Yes	1st Mortgage
Associated Oil 5s	10	Yes	Yes	1st Mortgage
Atlantic Ref Co 6s	10	Yes	Yes	Debenture
California Pet Co 6s	10	Yes	Yes	1st Mortgage
Gulf Oil 6s	4	No	No	Debenture
Gulf Oil 7s	12	Yes	Yes	Debenture
Marland 8s	5	Yes	No	1st Mortgage
Marland 8s	10	Yes	Yes	Debenture
Magnolia 6s	15	Yes	Yes	1st Mortgage
New England 8s	10	No	Yes	1st Mortgage
New England 8s	5	Yes	Yes	Debenture
New England 8s	12	No	No	Debenture
Oil Fields Mexico 6s	10	No	No	Debenture
Pan American 7s	10	Yes	Yes	1st Mortgage
Mexican Pet. 8s	15	Yes	Yes	Debenture
Pure Oil 6s	30	No	No	1st Mortgage
Shaffer 8s	3	Yes	Yes	Debenture
Shaffer 6s	10	Yes	Yes	1st Mortgage
Shaffer 7s	3	Yes	Yes	Collateral T
Sinclair 7½s	5	Yes	Yes	Collateral T
Sinclair 6s	3	No	No	1st Mortgage
Standard N.Y. 7s	10	Yes	No	Debenture

Standard N.Y. 6½s	12	Yes	Yes	Debenture
Sun Oil 6s	10	Yes	Yes	Debenture
Sun Oil 7s	10	Yes	Yes	Debenture
Standard Ind. 5s	15	No	No	1st Mortgage
Hymble 7s	2	Yes	No	Debenture
Standard Calif. 7s	10	Yes	Yes	Debenture
Trde. Water 6½s	10	Yes	Yes	Debenture
Union Oil 5s	20	Yes	Yes	1st Mortgage

Table 5 Showing the Outstanding issues of Oil Company Bonds in 1914.

Issues	Yrs. to Maturity	Callable	Sinking Fund	Type
Associated Oil 5s	20	No	Yes	1st Mortgage
Associated Oil 5s	20	Yes	Yes	Collateral T
Gen. Petroleum 6s	20	Yes	Yes	1st Mortgage
Gen. Petroleum 6s	2	Yes	Yes	Collateral T
Houston Oil 6s	12	Yes	No	1st Mortgage
Houston Oil 6s	12	No	No	Debenture
Indian Ref. 6s	10	Yes	Yes	1st Mortgage
Indian Ref. 7s	5	Yes	Yes	2nd Mortgage
Indian Ref. 5s	5	Yes	Yes	1st Mortgage
Indian Ref. 5s	5	No	No	1st Mortgage
Indian Gas & Oil 5s	30	No	No	1st Mortgage
Mexican Pet. 6s	10	Yes	Yes	Collateral T
Oil Fields of Mexico 6s	10	Yes	No	Debenture
Pierce Oil 6s	10	Yes	No	Debenture
Texas Oil 6s	10	Yes	No	1st Mortgage
Texas Oil 6s	20	Yes	Yes	Debenture
Union Oil 5s	20	Yes	Yes	1st Mortgage
Union Oil 5s	10	No	No	Debenture
Union Oil 6s	5	Yes	No	Collateral T

STUDY OF THE RELATION BETWEEN EARNINGS AND BOND INTEREST:-

In Table 6 are listed ten companies, chosen at random, showing for each company the amount of bonds outstanding and net income for each year over the period 1922-1926. In order to get some idea of the relation of bond interest to net income before fixed charges for the group as a whole the figure 'number of times interest earned' for the group has been calculated. This figure was calculated from the information in Table 3.

It was obtained by applying the average rate of interest, found to be 6%, to total bonds outstanding for all of the companies each year, which resulted in the total amount of fixed charges for the year. Then this figure of total fixed charges was divided by total net income to obtain the figure 'number of times interest earned'. The number of times interest was earned was 14.5, 20.5, 11.5, 9.5 and 8.1 for the years 1926-25-24-23-22 respectively. It can be seen that the fluctuations have been violent, varying from 8.1 to 20.5, but at no time did the group as a whole approach a deficit. This group, at least, and the industry as a whole if these companies are representative, is not issuing more bonds than the quantity and stability of the earnings seem to warrant.

A substantial margin of earnings each year should mean that if any kind of management at all is used there will be sufficient funds to redeem the bonds at maturity. This

Table 6 Showing Bonds Outstanding and Net Income of 10 Companies for the Period 1922-26. (000omitted)

	1926		1925		1924		1923		1922	
	Bonds	Assets	Bonds	Assets	Bonds	Assets	Bonds	Assets	Bonds	Assets
Associated Oil Co.	21,525	17,216	23,746	18,509	24,000	14,369	24,000	13,293	5,979	8,457
Gulf Oil Copp.	38,904	55,847	42,804	53,898	48,945	33,741	35,000	21,994	76,000	32,563
Calif. Pet. Co.	18,452	7,907	7,151	7,496	7,892	4,415	8,766	7,676	791	4,587
Humble Oil Co.	25,000	23,715	25,000	28,446	25,000	14,551	25,000	8,311	25,000	2,347
Mexican Pet. Copr.	979	14,020	985	19,820	8,515	2,817	8,607	11,088	8,372	25,276
Producers & Ref. Corp.	3,362	3,351	2,871	2,355	3,645	2,286	3,916	3,462	5,421	3,877
Pure Oil Co.	10,430	11,627	20,813	14,066	28,005	12,223	4,026	12,581	11,095	6,092
Skelley Oil Co.	1,874	6,453	6,470	4,864	9,300	1,018	2,846	1,937	3,182	2,123
Standard Oil-N.Y.	114,172	71,646	35,000	72,175	20,000	38,671	50,000	18,363	50,000	22,834
Union Oil Co.	22,440	12,951	24,100	11,249	20,110	11,608	24,259	8,809	18,468	11,715
	257,138	224,732	189,040	233,081	195,412	135,699	186,420	107,514	204,308	119,868
Interest Charges	15,428		11,342		11,724		11,185		12,258	
Times Interest Earned		14.5		20.5		11.5		9.5		8.7

"Manual of Industrials"—John Moody.

information is meaningless as applied to any individual company in the group, but is significant for the group as a whole. An investor might buy a bond in any of the companies included in the study and lose his money, but if the risks were distributed by buying from a number of companies the chances of loss would be small. It is difficult, if not impossible, to arrive at an answer as to the security of the principal of a bond and an investor will have to examine the information available for a particular company before placing an investment, if he wishes to look after his best interests.

STABILITY OF INCOME:-

In the study of the stability of income we have sought to compare the stability of the oil industry income with that of other industries. For this purpose of comparison three other industries have been chosen, railroads, public utilities, and steel companies. Ten companies from each industry have been chosen at random and their assets and net income listed over a period of ten years. The detailed figures are given in Tables 7, 8, and 9 Then for each year the percent of net return on assets was calculated. The same group of companies used in Table 2 is used in this study to represent the oil industry.

The following table shows the percents as calculated for each of the industries:

	1925	1924	1923	1922	1921	1920	1919
1 Steel	4.7	4.3	5.8	2.5	2.4	5.9	4.6
2 Public Utilities	4.0	4.1	4.3	4.3	4.2	4.02	4.2
3 Railroads	5.3	4.3	4.4	3.6	2.1	.5	1.8
1 Oil Companies	11.8	8.8	7.8	10.5	8.9	14.2	12.9

	1918	1917	1916
Steel	6.8	10.6	
Public Utilities	4.6	4.8	4.7
Railroads	2.8	4.7	5.5
Oil Companies	14.2	13.8	15.3

The resulting percents for each of the industries has been tabulated in Chart 3.

1. "Manual of Industrials"--John Moody.
2. "Manual of Public Utilities"--John Moody.
3. "Manual of Railroad Investments"--John Moody.

Table 7 Showing Assets and Income for 10 Railways Over Period of 1916 -1925. (Figures 1000 omitted)

Assets	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916
A,Q.& Western	#5,279	46,198	* 29,843	34,354	*38,117	*82,287	*44,613	*27,932	*1,642	*16,597
Bess. & Lake Erie	5,315,147	2,773,716	6,835,256	4,809,527	2,279,367	3,357,151	2,056,579	4,250,326	3,700,385	5,310,523
Cal. W. & Nav Co.	94,138	62,413	86,439	87,216	91,327	73,196	51,373	72,073	118,905	103,334
Colo & Wyo.RR Co.	183,877	270,213	29,503	* 87,677	* 65,739	39,230	46,539	164,679	268,099	452,052
Maine Central	3,104,329	2,307,680	1,983,141	2,842,642	*466,962	*1,317,615	5,114	385,432	3,449,284	3,807,929
B. & O.	43,034,687	38,084,324	42,133,129	23,785,005	21,853,546	*3,115,017	12,750,891	13,599,268	30,567,889	32,313,812
Cincinnati, Ind & W	300,519	308,809	295,147	58,606	* 728,402	*709,768	* 589,688	* 137,829	382,930	540,355
Boston & Maine	12,407,815	8,972,021	2,087,414	6,675,740	588,365	*4,336,687	5,790,021	5,377,810	12,282,048	15,842,846
Chesapeake & Ohio	30,018,072	21,892,920	19,135,355	14,410,330	13,660,924	10,765,088	10,596,494	19,503,450	19,503,450	16,429,625
Hucking Valley	3,619,213	3,518,080	2,454,067	2,245,067	1,560,742	1,160,059	1,888,145	2,638,561	3,287,312	2,457,448
Income										
A,Q.& Western	6,671	6,618	6,585	6,575	6,757	6,600	7,817	7,812	7,714	7,658
Bess. & Lake Erie	51,218	49,752	45,491	43,737	43,737	49,805	40,303	38,375	34,640	23,984
Cal. W. & Nav. Co.	2,405	2,381	2,365	2,334	2,444	2,312	2,297	2,310	2,314	3,312
Colo. & Wyo. RR. Co.	5,764	5,733	5,568	5,562	5,376	5,792	5,573	5,849	5,515	5,280
Maine Central	57,233	55,825	54,748	61,510	61,510	65,247	66,686	59,524	56,998	52,399
B. & O.	936,145	893,755	984,925	941,337	941,337	949,213	1,007,300	889,583	842,339	785,754
Cincinnati, Ind W	18,419	18,202	17,817	16,040	16,040	16,736	17,245	16,305	16,101	16,000
Boston & Maine	250,607	249,296	247,270	270,087	270,937	279,624	282,321	226,406	141,462	134,150
Chesapeake & Ohio	418,174	388,996	403,530	376,273	376,274	372,496	396,915	866,044	345,889	316,750
Hucking Valley	68,269	67,766	69,895	68,922	68,822	69,710	70,950	56,266	52,283	48,114

Table 8 Showing Assets and Income for 10 Public Utilities Over Period of 1916-1925. (Figures 1000 omitted).

Assets	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916
Minn. Gas Light	882	965	948	756	1,105	508	544	79	349	764
Qunicy E. Light	261	170	147	135	70	79	102	79	67	65
N.Y. Edison	13,370	13,828	9,975	14,047	6,521	11,261	9,104	7,332	8,755	10,886
Northern Union Gas	99	19	324	494	126	299	182	* 45	54	264
Electrical Sec. Corp.	664	808	475	280	479	313	325	300	716	303
The Mackay Co.	4,616	4,613	8,458	4,606	4,226	4,333	4,395	4,430	4,626	4,219
Cities Service	18,989	16,773	14,202	16,093	12,997	23,997	19,977	22,289	19,232	10,120
Peoria Water Works	242	212	196	214	189	151	138	136	165	173
Cuban Telephone	2,579	3,344	1,643	2,051	1,643	1,375	1,467	1,055	838	694
Bell Tle. Penn.	12,396	9,788	8,372	8,215	8,189	3,980	4,717	4,280	4,872	5,976
	54,099	49,632	46,535	44,541	39,965	41,650	40,351	39,675	39,717	33,464
Income										
Minn. Gas Light	13,306	12,723	11,892	11,265	10,930	10,713	10,425		9,980	10,181
Quincy E. Light	1,313	1,143	1,089	988	954	762	700	709	653	561
N.Y. Edison	328,235	282,576	265,277	265,910	242,980	196,120	170,110	178,012	174,677	170,807
Northern Union Gas	8,757	7,862	6,962	6,392	7,230	4,999	4,742	4,065	5,035	4,822
Electrical Sec. Corp.	12,910	12,315	12,083	10,126	9,445	8,839	9,366	9,709	9,707	9,802
The Mackay Co.	94,294	93,515	93,503	93,493	93,474	93,428	93,304	93,298	93,293	92,736
Cities Service	609,391	553,080	491,317	591,317	4 40,615	557,855	531,643	488,700	398,520	299,348
Peoria Water Works	4,885	4,972	4,790	4,780	4,609	4,602	4,403	4,338	3,884	3,706
Cuban Telephone	34,754	29,599	26,413	26,413	25,909	22,453	17,649	17,390	20,169	16,640
Bell Tele. Penn.	251,002	216,547	179,576	179,576	138,903	134,997	107,789	104,587	104,571	104,668
	1,348,836	1,214,332	1,082,892	1,023,201	936,949	1,034,761	959,131	851,678	820,489	713,271

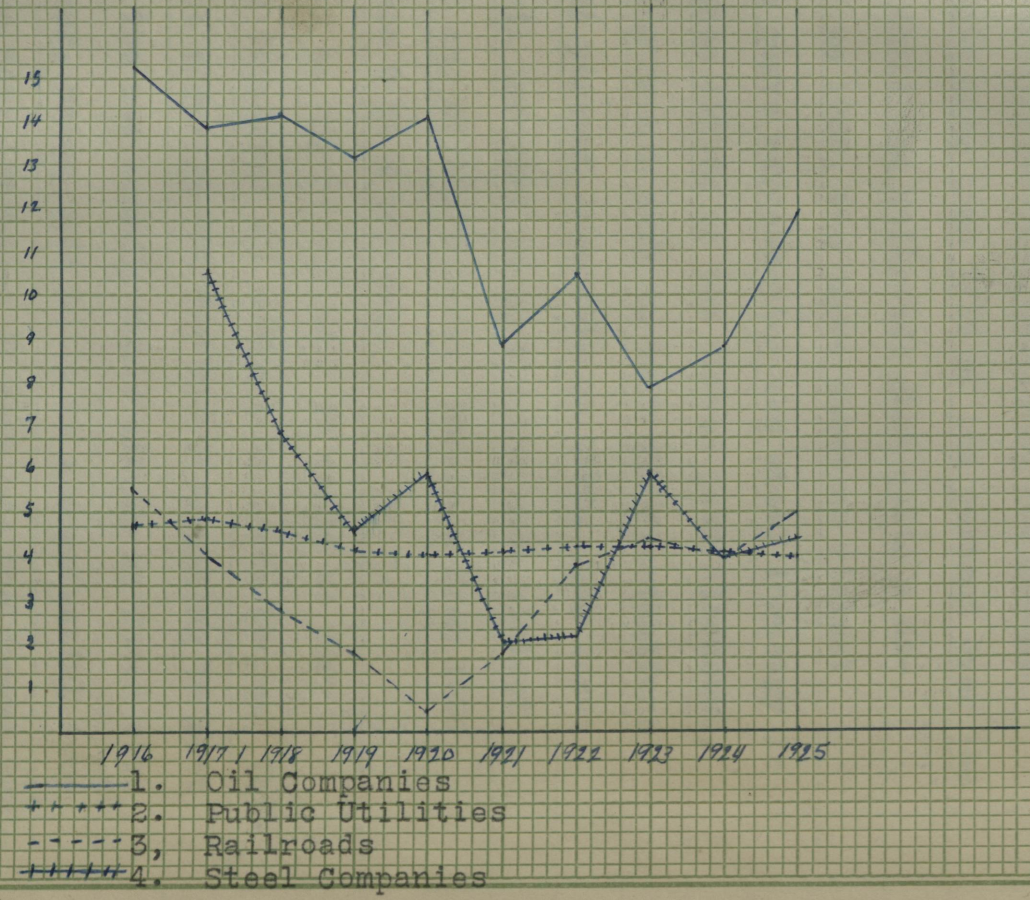
Table 9 Showing Assets and Income of 10 Steel Companies Over Period of 1917-1925.
(Figures 1000 omitted)

Assets	1925	1924	1923	1922	1921	1920	1919	1918	1917
Crucible	116,161	111,576	136,616	132,557	134,513	145,587	130,046	112,435	90,869
Pittsburgh	48,231	47,344	44,096	41,774	41,493	42,887	41,718	37,930	34,739
U.S.Steel	2,445,643	2,420,882	2,340,653	2,339,105	2,430,546	2,431,546	2,365,882	2,517,617	2,399,550
Cleveland Cl.	79,663	62,740	64,618	58,885	57,437	63,549	55,357	50,805	46,949
Crane Co.	96,362	90,785	85,389		66,286	78,325	64,486		
Colorado F & L	81,503	79,687	79,204	78,878	79,349	83,392	82,552	100,132	95,377
Hydraulic	11,925	12,032	12,215	12,028	17,764	24,956	17,346		
Press Steel Car	50,070	50,149	51,940	50,510	44,491	55,939	45,222	47,564	44,788
Sloss Sheffield	36,582	35,789	32,364	32,404	34,675	33,379	34,916	32,303	27,844
	2,966,900	3,003,984	2,796,085	2,746,089	2,906,554	2,958,547	2,838,515	2,898,786	2,840,106
Income									
Crucible	4,781	4,518	4,892	* 3,415	5,853	12,092	9,921	14,180	12,786
Pittsburgh	1,070	1,468	1,983	1	1,735	2,804	2,710	4,466	7,790
U.S.Steel	117,711	112,377	136,718	68,020	65,191	139,043	106,938	168,191	255,209
Cleveland Cl.	1,691	862	3,092	880	*1,665	4,028	2,152		
Crane Co.	8,342	8,008	10,600	3,133	1,880	9,334	11,363		
Colorado F & L.	3,750	2,559	2,552	1,181	* 889	3,144	1,341	4,756	5,983
Hydraulic	165	281	* 78	* 471	*1,629	1,239	1,564	2,067	1,768
Press Steel Car	1,532	2,085	2,799	58	1,081	3,194	5,338	4,818	2,940
Sloss Sheffield	2,815	2,089	3,052	895	848	2,646	2,322	2,000	1,750
	141,857	135,247	165,660	70,282	71,407	178,424	133,649	200,308	288,326

CHART 4

Chart showing relation between income of oil companies, public utilities, railroads, and steel companies over the period 1916–1925.

(Data from table in the text)



From the curves, representing the return on assets for the four industries, it may be seen that the percent of return in the oil industry is considerably higher than the others. This is as it should be, considering that the oil industry is the most speculative in character. The public utility group are by far the most stable in the group, fluctuating scarcely more than 7/10 of one percent over the ten year period. While the railroads show quite a depression from 1917 to 1922, the curve shows no violent fluctuations. The curve representing the steel industry is more fluctuating than either of the curves just discussed, but after descending from a peak in 1917 the fluctuations have been within 2½ percent from 1918 to 1925. The curve representing the oil industry is by far the most violent in fluctuations of any of the curves. Earnings from 1920 to 1921 dropped from 9 to 4 percent.

From the chart we may reason that it would be very unsafe for a newly organized oil company to issue bonds. This is true because the earnings are far too fluctuating to meet fixed charges and the new company would likely be faced with foreclosure, however, which have built up a substantial surplus through a wise administration of earnings the danger would not be nearly so great. On account of the violent fluctuations in income it may be seen that issuing bonds by oil companies would be far more hazardous than issuing by any of the other three industries.

SUMMARY

The following is a list of the points which have been made and the conclusions reached in this study:

1. Borrowing through the medium of bond issue in the oil industry is no more popular now than it was prior to the World War.

2. Over the past fifteen years, the percent of assets financed by bond issue has been very fluctuating, but never higher than 10%.

3. The bonds outstanding for the industry has varied inversely as the prosperity of the industry.

4. The bond financing of oil companies has been of a temporary rather than of a permanent nature.

5. There has been a steady increase in the proportion of debenture sinking fund bonds accompanied by a decrease in the proportion of mortgage bonds.

6. Debenture bonds are the most popular type of bonds used by the industry.

7. The most popular lengths of bond issue in 1926 were five, ten and fifteen years.

8. Since 1914 there has been a steady decline in bond issues of over twenty years to maturity, and a steady increase in bond issues of from 11 to 15 years to maturity.

9. There has been a steady increase in the use of bonds of ten years to maturity or under, which at the present time comprises 60% of all oil bonds issued.

10. The percent of oil bonds with the callable privilege has increased steadily over the period 1914 to 1926.

11. When earnings are high oil companies use the callable privilege to retire bonded indebtedness and practically all bonded indebtedness is paid off as rapidly as sinking fund requirements demand it.

12. The industry is not issuing more bonds than is warranted by the amount and stability of the earnings.

13. Oil company income is very fluctuating, much more so than that of public utilities, railroads, and steel companies.

14. The fluctuations in earnings would make it unsafe for a newly organized oil company to issue bonds.

15. It would be much more hazardous for oil companies to issue as many bonds as railroads, steel companies, and public utilities on account of the instability of its earnings.

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